# Biological Soil Crusts – General Info Sheet

October 18, 2001

**Functions:** Biological Crusts have several important ecological functions.

Fixing Nitrogen: Crusts may have been the primary source of nitrogen to many arid lands prior to their removal. Plants growing with soil crusts usually have more vigor and higher nutrient value to grazers.

Water infiltration: Most crust forming organisms absorb water quickly. This water may then infiltrate the soil below.

Reduced Erosion: Crusts bind and protect soil from both water and wind erosion.

Altered Germination: Preliminary studies show reduced germination of cheatgrass on soil crusts. Sage brush germinates best on hard surfaces, so could be enhanced by soil crusts. (Research is badly needed in this area)

**Name:** Biological Soil Crusts have a lot names including words like: microbiotic, cryptogamic, cryptobiotic, and microphytic. Those words are unnecessary jargon that have probably made people resistant to learning about crusts. It is better to refer to them simply as 'crusts', or 'soil crusts', or when a technical name is needed, then 'biological soil crusts' to distinguish them from chemical soil crusts.

**Geography and Form:**

Crusts grow in arid lands.

Cool Deserts – Great Basin and Northward

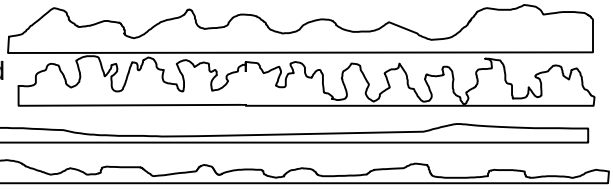
Forms: Rolling

Pinnacled

Hot Deserts – Mojave and Southward

Forms: Flat

Rugose



**Components:**

Cyanobacteria (Blue-green Algae) – fix nitrogen, bind soil particles together

Mosses (Bryophytes) – cover & protect soil, very rapid water absorption

Lichens – cover & protect soil, rapid water absorption, some species fix nitrogen

**General Succession** for Artemisia tridentata ssp. wyomingensis habitat (times are guesstimates since last ground disturbance):

1. 1-10 yrs Cyanobacteria (CB) colonize
2. 10-15 yrs CB remain, mosses (M) colonize
3. 15-25 yrs CB remain, M become dominant crust formers, lichens (L) colonize
4. 25-75 yrs CB and M remain, L become dominant
5. 75-200 yrs All remain with L dominant, crusts extend over nearly all ground between plants.

**Disturbances:** Fire – light fires do not kill much, hot fires may severely damage crusts

Mechanical action on ground, especially compression

- Vehicles
- Hikers
- Grazers

} Crusts can be maintained under occasional disturbance, but not under heavy use by these disturbances

**ID Guide:**

Cyanobacteria

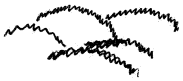
soil holds together with particles underneath hanging on by tiny fibers

Mosses

Leafy, usually with white hairs

green to almost black

spore capsule



Cushion-like or evenly dotted

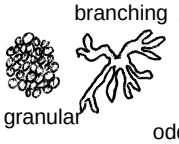
Lichens

grey, brown, pink, yellow, orange, white, rarely moss-green

bumpy or lumpy

branching

granular



odd color from surrounding

**Selected Resources:**

Belnap, J., J.H. Kaltenecker, R. Rosentreter, J. Williams, S. Leonard and D. Eldridge. 2001. Biological Soil Crusts: Ecology and Management. USDI Bureau of Land Management National Science and Technology Center, Tech. Ref. 1730-2.

Above reference downloadable at http://www.blm.gov/nstc/library/pdf/CrustManual.pdf (expect a very large file).

http://www.blm.gov/nstc/soil/crusts/

http://www.soilcrust.org/

Nevada Natural Heritage Program